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Lee et al.

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(54) **CONNECTOR**

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H01R 13/405 (2006.01)
H01R 13/502 (2006.01)

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(58) **Field of Classification Search**
CPC . H01R 13/533; H01R 13/5025; H01R 13/405
See application file for complete search history.

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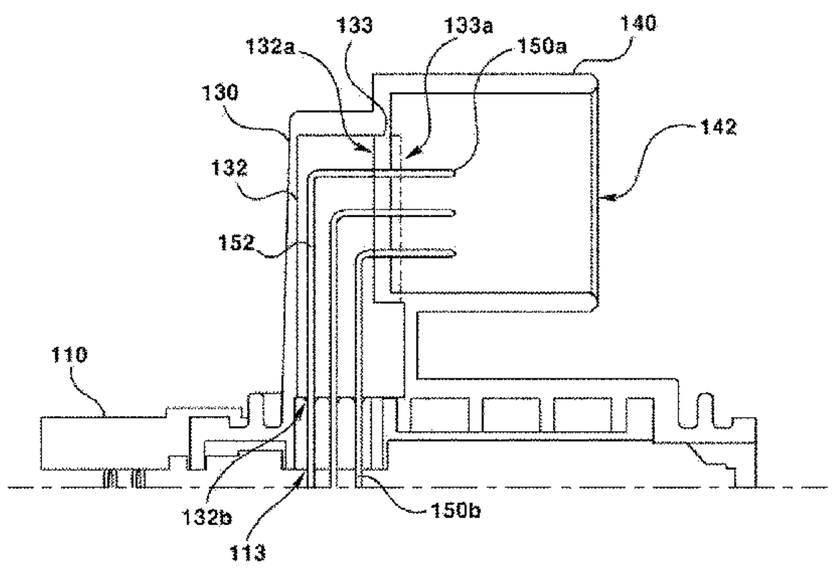
(57) **ABSTRACT**

The present invention relates to a connector which is disposed outside a case, the connector comprising: a terminal protruding at one end thereof into the case and protruding at the other end thereof out of the case; an inner housing coupled to the terminal so as to allow the terminal to protrude at the one end and the other end thereof; a pad disposed on one surface of the inner housing; and a housing completely surrounding the inner housing and the pad, wherein the housing comprises: a protrusion portion protruding from one surface of the case; and a mounting portion having a terminal groove in which the other protruding end of the terminal is placed.

20 Claims, 9 Drawing Sheets



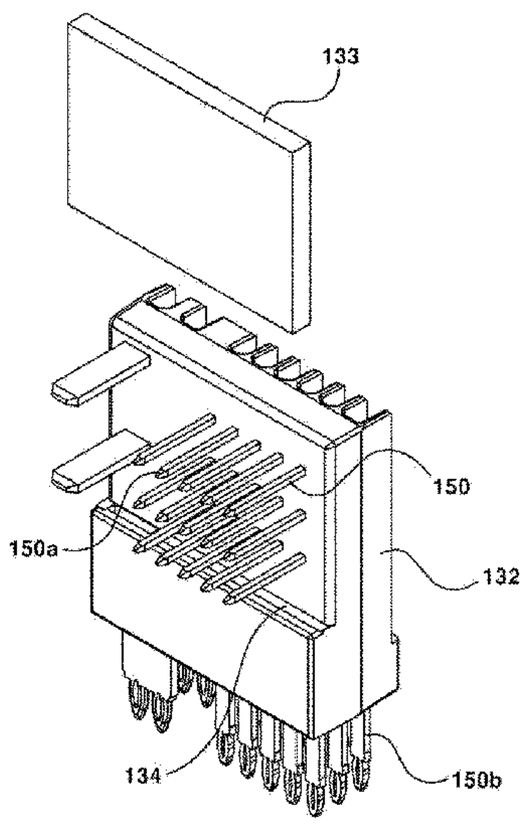


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FIG. 1

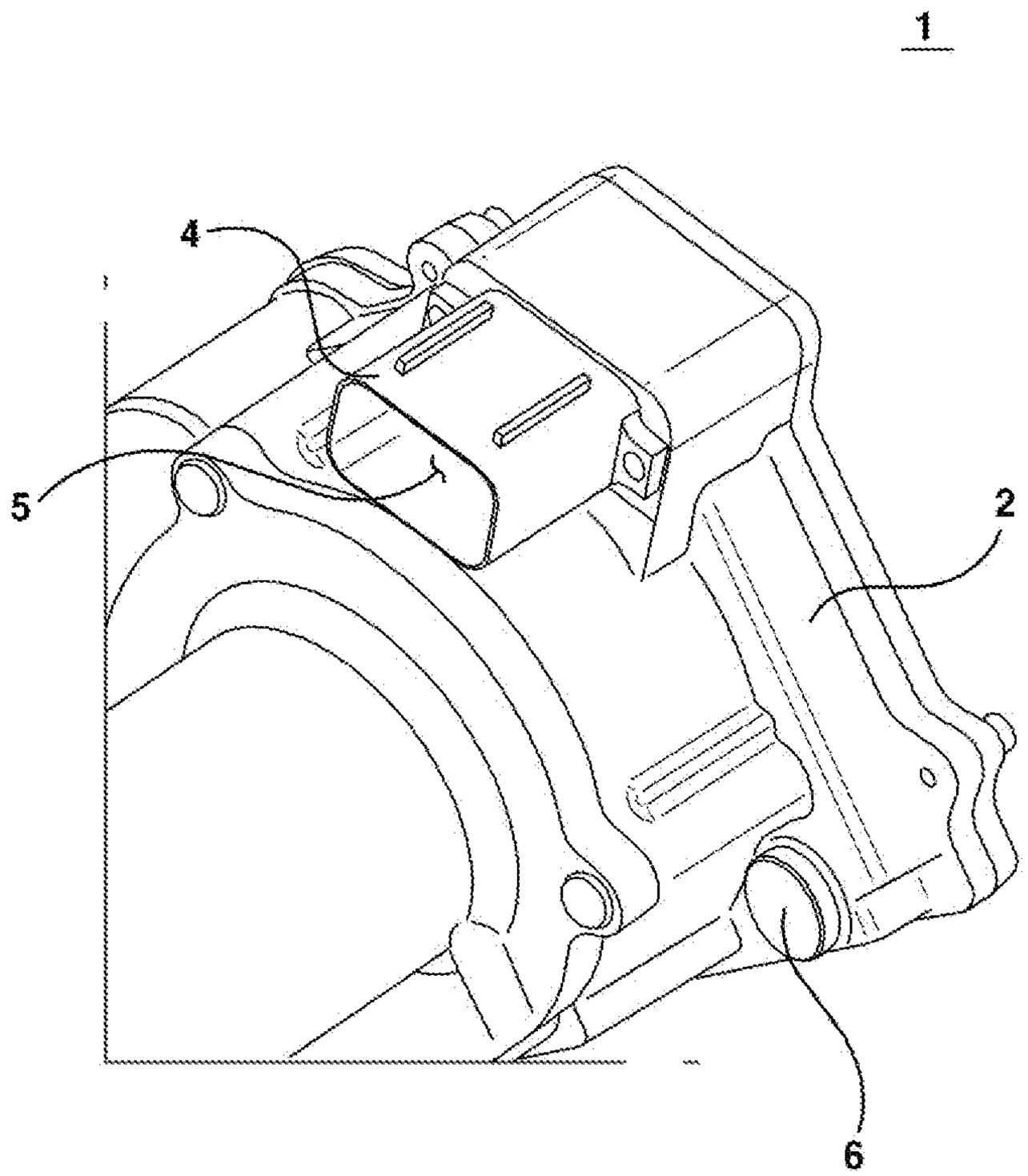


FIG. 2

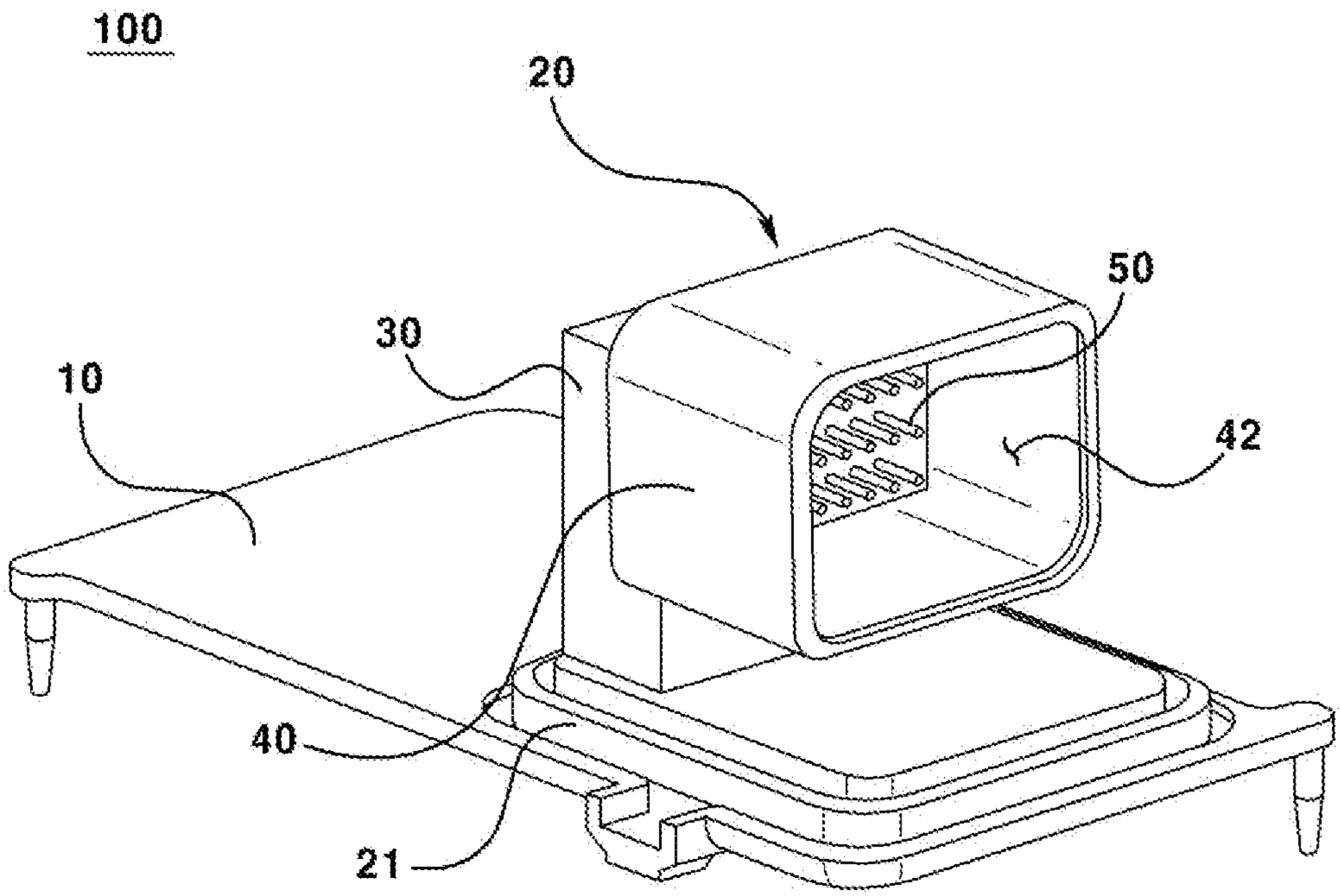


FIG. 3

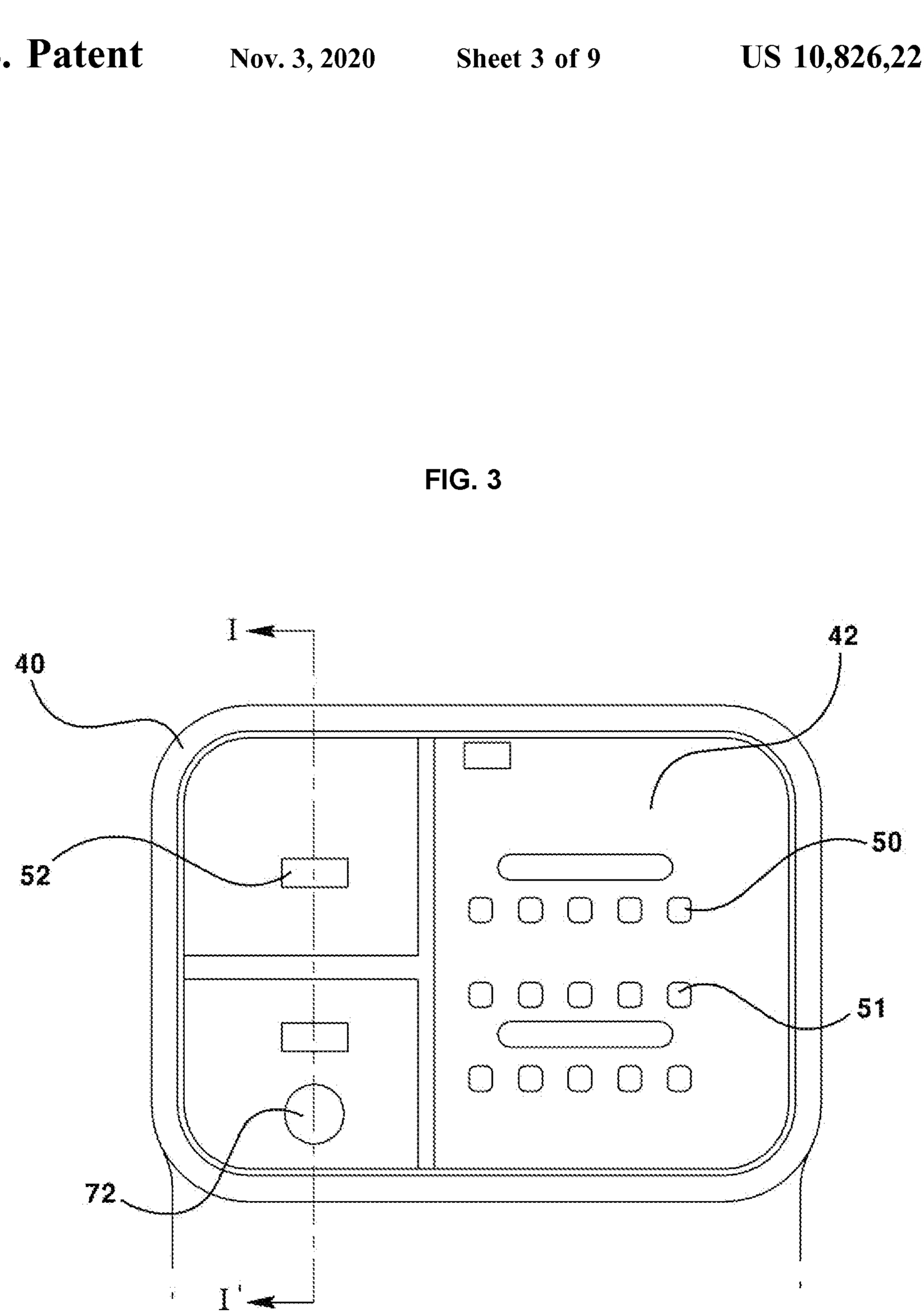


FIG. 4

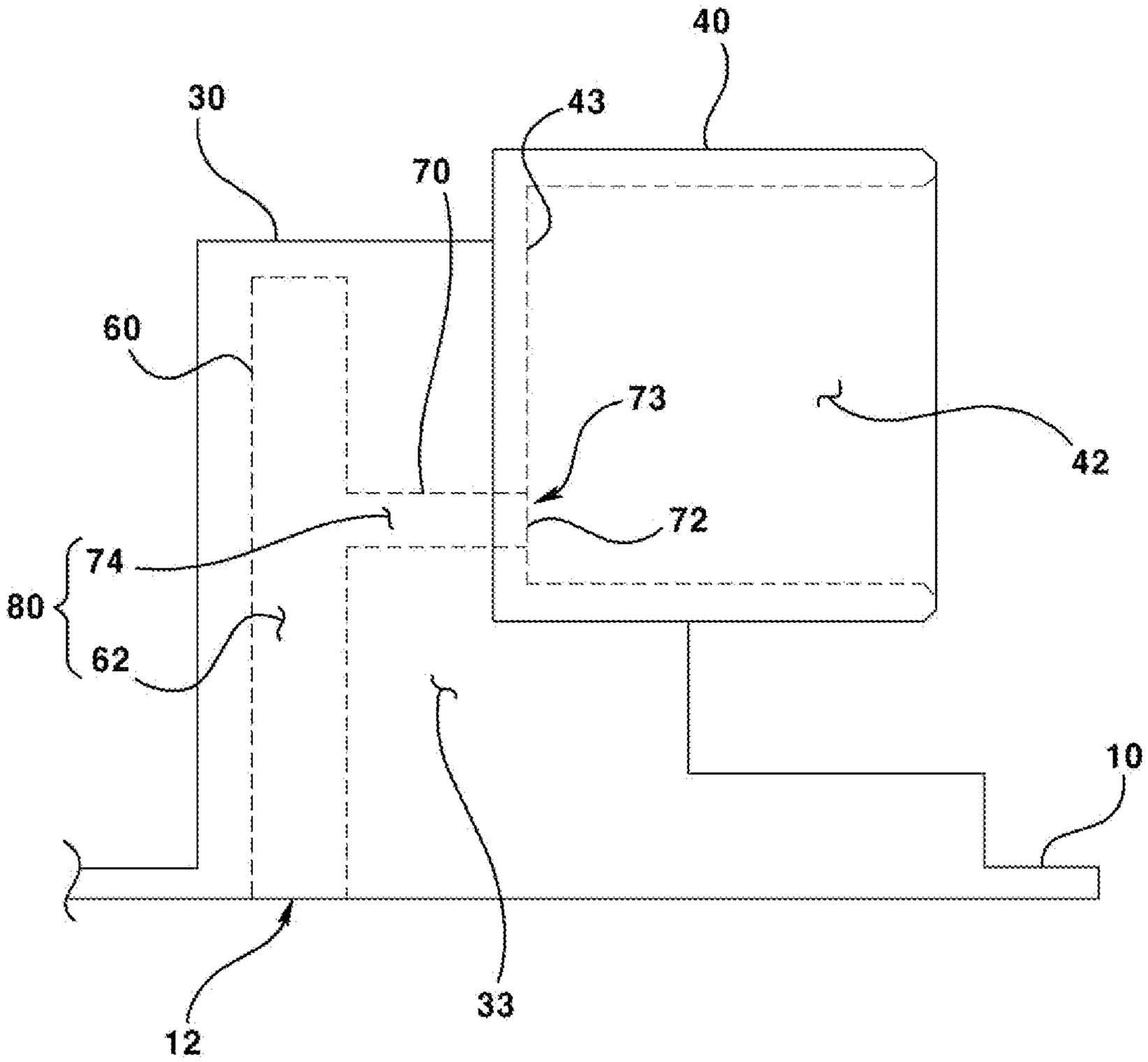


FIG. 5

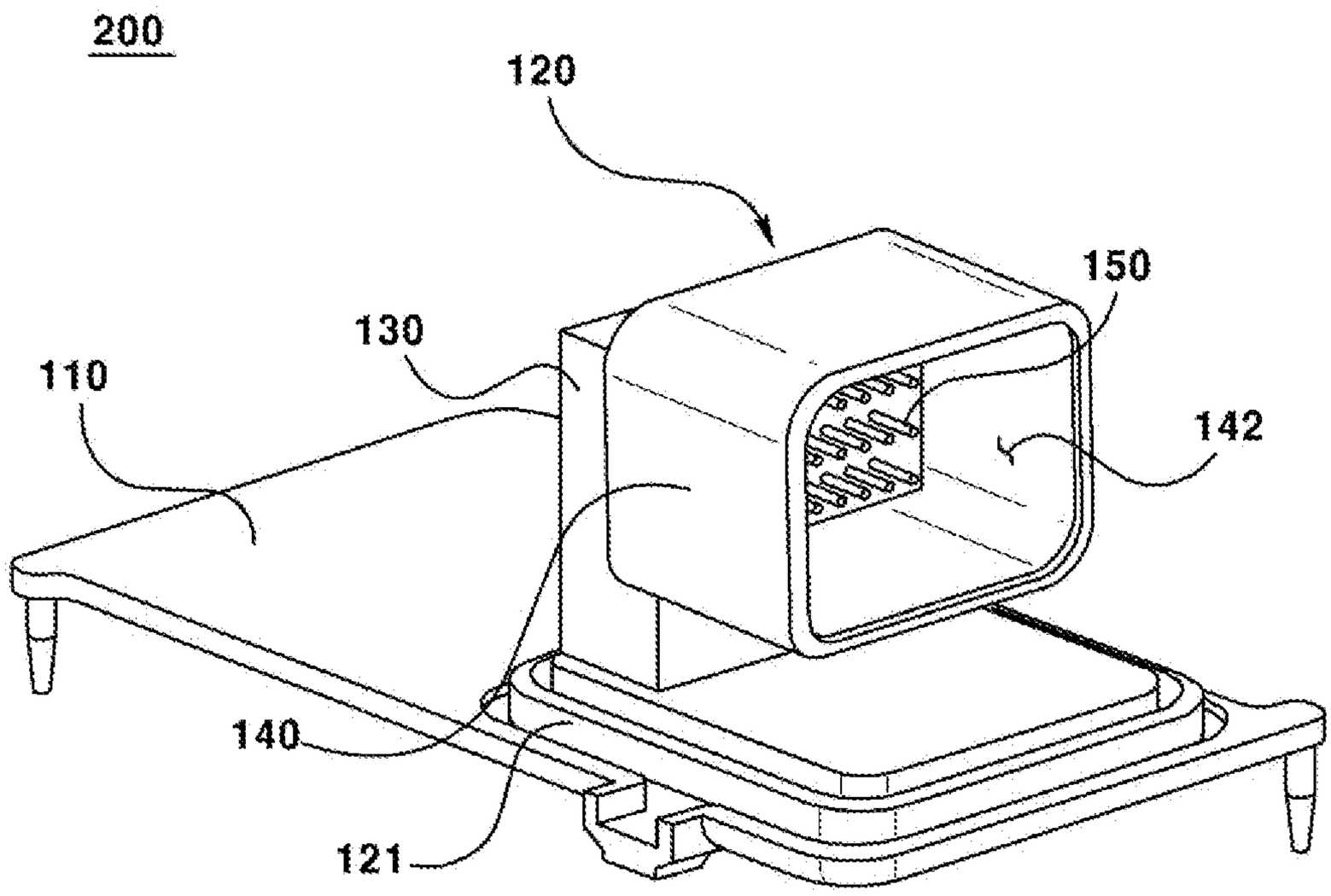


FIG. 6

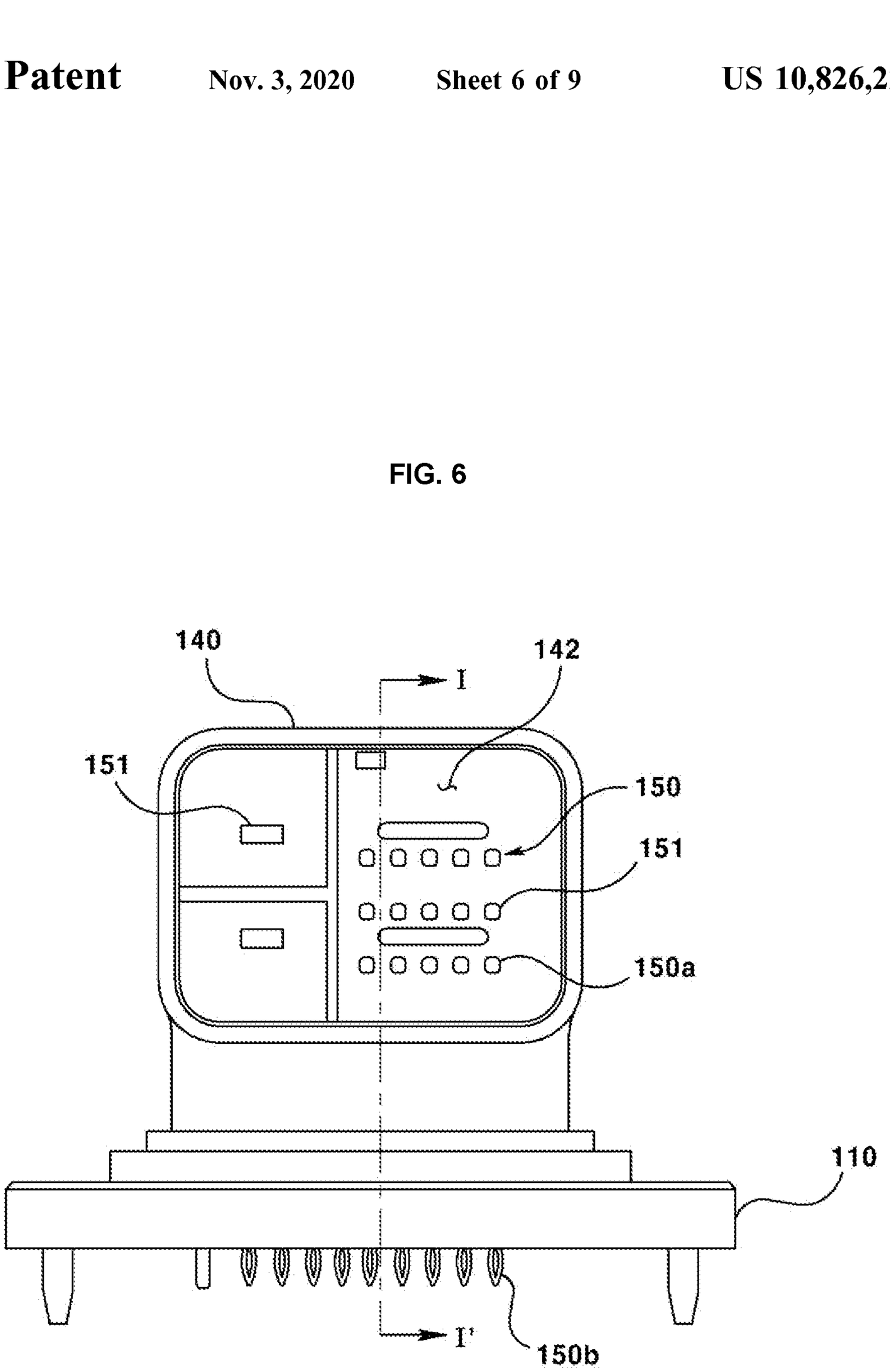


FIG. 7

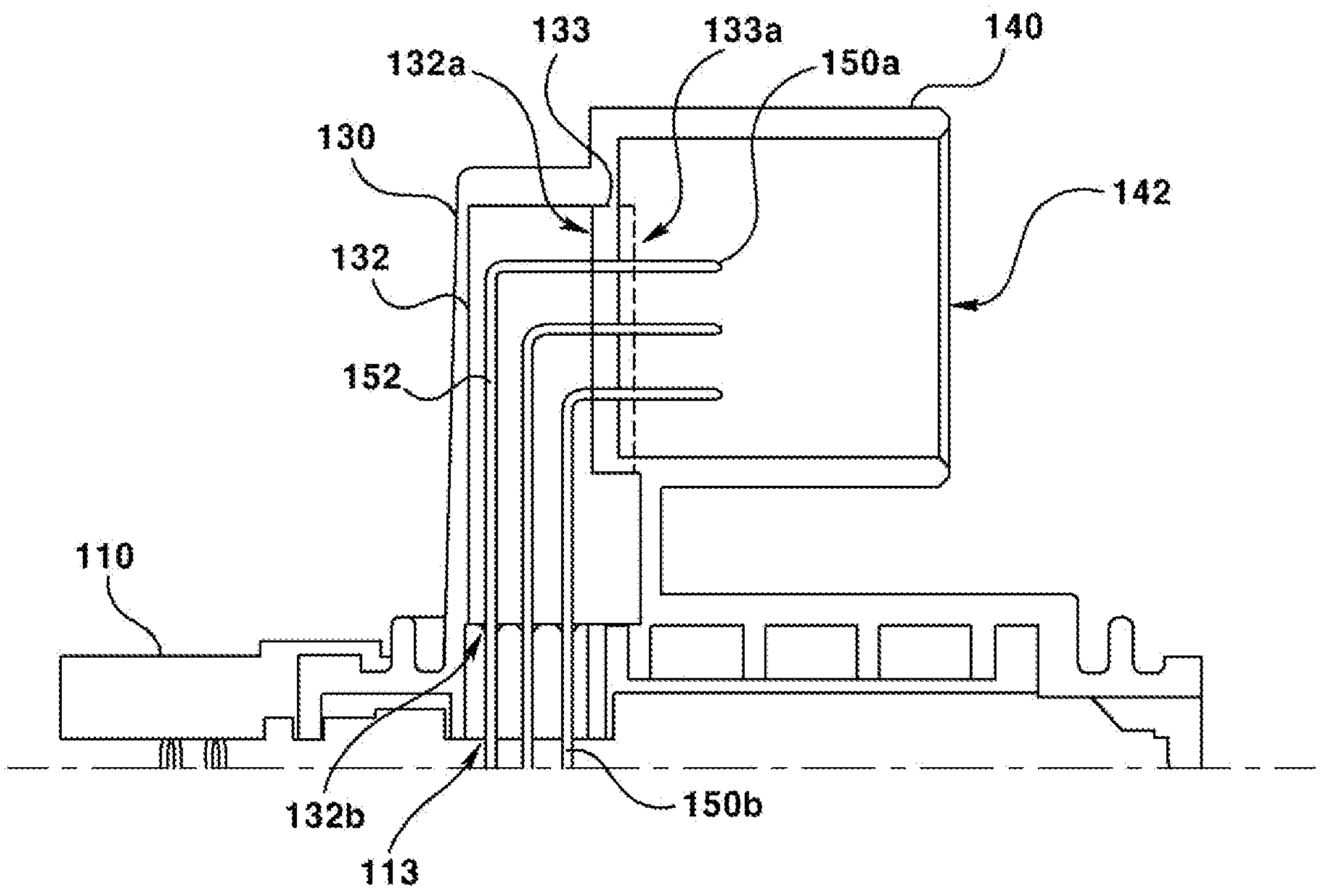


FIG. 8

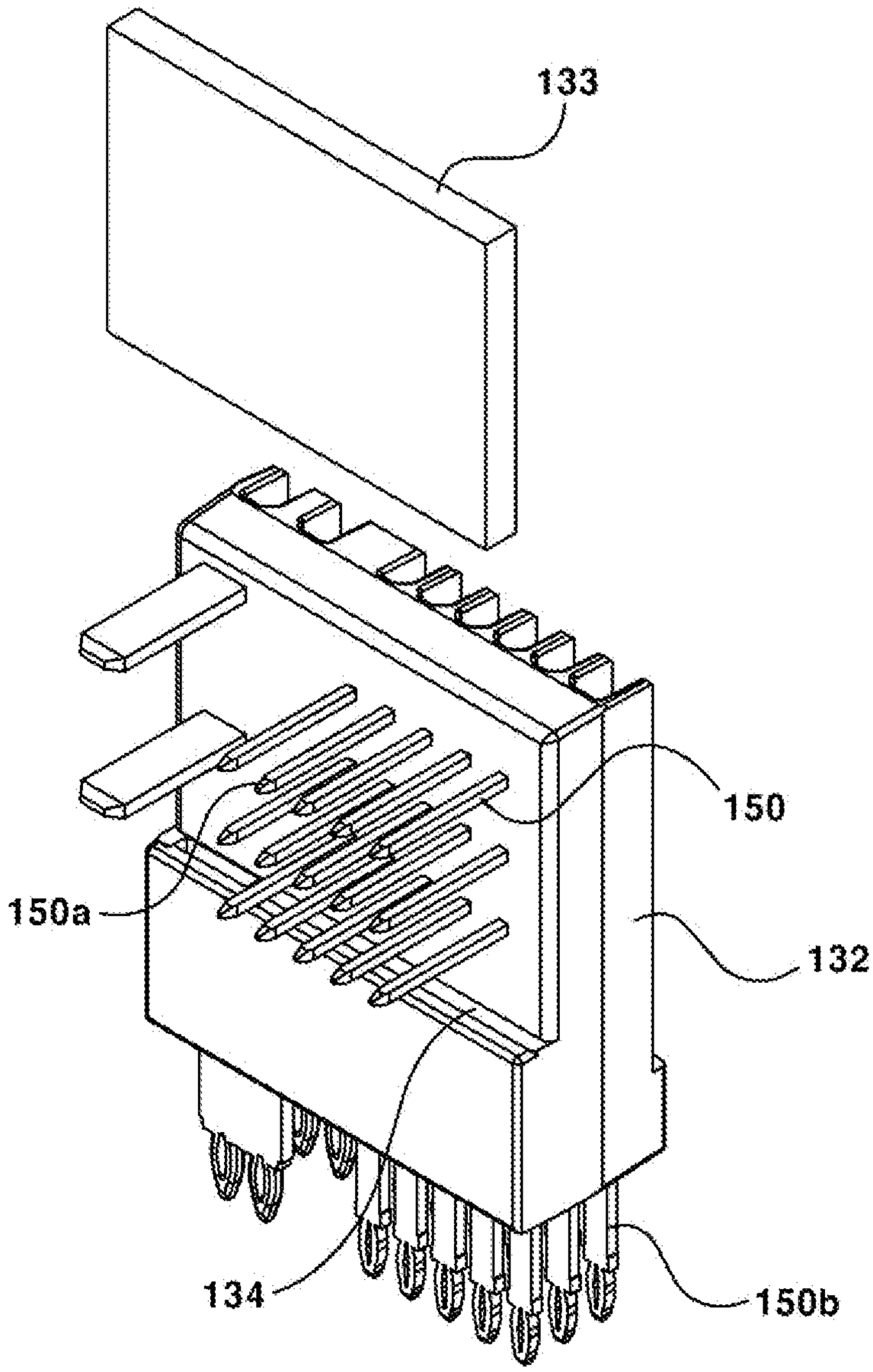
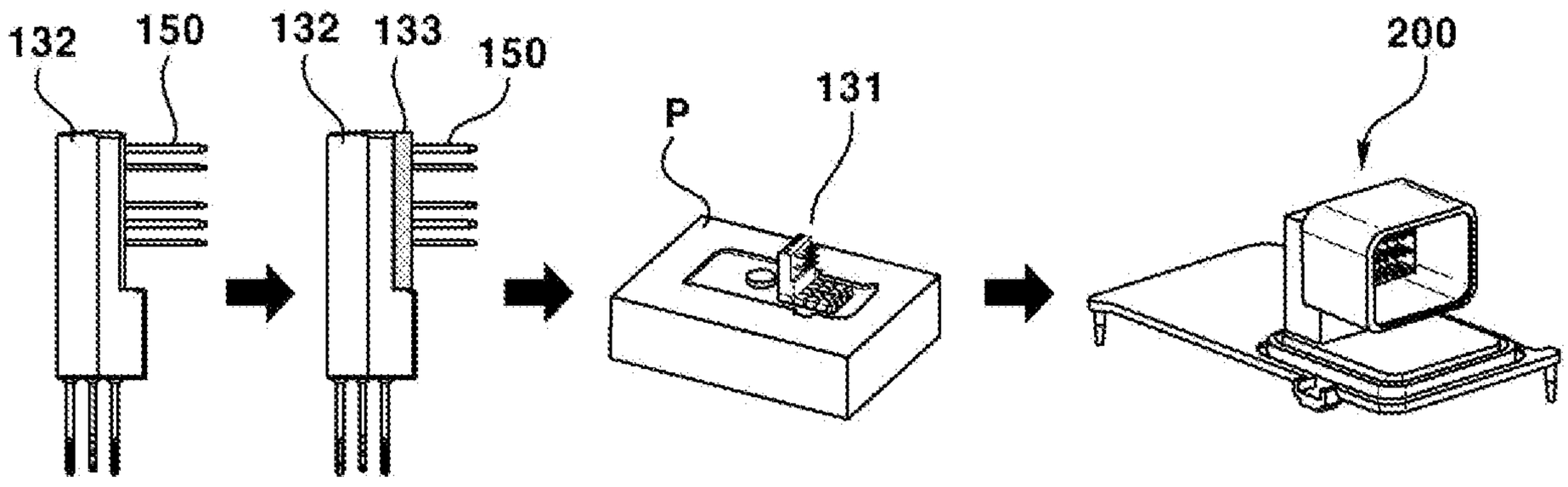


FIG. 9



CONNECTOR

CROSS-REFERENCE TO RELATED PATENT APPLICATIONS

This application is a U.S. National Stage Application under 35 U.S.C. § 371 of PCT Application No. PCT/KR2018/000453, filed Jan. 10, 2018, which claims priority to Korean Patent Application No. 10-2017-0004208, filed Jan. 11, 2017, and Korean Patent Application No. 10-2017-0008536, filed Jan. 18, 2017, whose entire disclosures are hereby incorporated by reference.

TECHNICAL FIELD

The present invention relates to a connector.

BACKGROUND ART

Electrical component, for example, a clutch actuator controlling the clutch is provided with a control module which controls the operation of a motor or a solenoid. The control module operates the motor or the solenoid according to the control command of the control unit, thereby shifting gear.

The control module comprises a printed circuit board on which a plurality of electronic components are mounted, and is disposed inside the housing. At this time, the housing may be provided with a connector for electrical connection between the control module and other components.

FIG. **1** is a perspective view showing a part of an electrical component according to the prior art.

Referring to FIG. **1**, external shape of an electrical component **1** according to the prior art is formed by a housing **2**. Various electronic components comprising a printed circuit board are disposed inside the housing **2**. A connector **4** wherein a mounting groove **5** is formed is provided on the outer surface of the housing **2**. As for an example of the above mentioned electrical components, a terminal (not shown) which is electrically connected to the printed circuit board, is disposed on the bottom surface of the mounting groove **5** and may be exposed to the outside of the housing **2**. Therefore, a device with a separate plug is inserted into the mounting groove **5**, so that when the plug and the terminal are electrically contacted, power can be supplied to the electronic parts or a control command necessary for driving can be transmitted and received.

As described above, various electronic components comprising a printed circuit board are disposed inside the housing **2**. The electronic components generate heat in accordance with driving, and gas or liquid may be generated in the housing **2** due to the generated heat. Therefore, a discharge port **6** for discharging heat, gas or liquid to the outside is formed on the outer surface of the housing **2**.

The discharge port **6** is formed in an area of the outer surface of the housing **2** corresponding to an arrangement area of the electronic component. At this time, the discharge port **6** is formed as a hole penetrating the outer surface of the housing **2** from the inner surface thereof, and it may be configured to have a separate shielding film to cover the hole. The shielding film prevents moisture or dust from flowing into the housing **2** and discharges heat or gas existing inside the housing **2** to the outside.

According to the above configuration, since the discharge port **6** for discharging heat or gas exists separately in the housing **2**, there is a problem that the manufacturing process is complicated and the manufacturing cost is increased. In addition, since various components comprising the connector **4** are disposed in the housing **2** in addition to the discharge port **6**, there is a space limit in the arrangement of the respective components in view of the recent trend of downsizing the product.

On the other hand, the material of the housing in which the connector is formed is generally made of synthetic resin or plastic in consideration of the manufacturing cost and weight of the product. The terminal is connected to the printed circuit board at one end, and the other end is exposed to the outside through the bottom surface, so that the bonding between the housing and the terminal is essential.

However, considering the coefficient of thermal expansion and the low adhesive force between the metal and the plastic, the plastic housing and the metal terminal have a disadvantage in that the mutual bonding strength is low. Particularly, the housing is generally manufactured by molding in a state where terminals are disposed, and a gap may be formed between the housing and the terminal due to heat generated at this time. Because of this, a tolerance may be generated between the actual position of the terminal and the original design region, and as a result, there is a problem in that the quality and reliability of the product may be deteriorated.

DETAILED DESCRIPTION OF THE INVENTION

Technical Subject

The present invention has been proposed in order to solve the above-mentioned problems, and an objective of the present invention is to provide a connector capable of reducing the manufacturing cost as the number of parts is reduced.

Another object of the present invention is to provide a connector capable of enhancing a coupling force between a terminal and a housing.

Technical Solution

As for an exemplary embodiment, in a connector which is disposed outside a case, the connector comprises: a terminal protruding at one end thereof into the case and protruding at the other end thereof out of the case; an inner housing coupled to the terminal so as to allow the terminal to protrude at the one end and the other end thereof; a pad disposed on one surface of the inner housing; and a housing completely surrounding the inner housing and the pad, wherein the housing comprises: a protrusion portion protruding from one surface of the case; and a mounting portion having a terminal groove in which the other protruding end of the terminal is placed.

The material of the pad may be an elastically deformable material.

A pad seating portion for seating the pad may be provided in a front surface of the inner housing wherein a portion of the front surface is recessed rearward to be stepped with respect to the other area.

The width of the pad seating portion may be corresponding to the width of the pad.

A separate pad may be coupled to the lower surface of the inner housing.

The inner housing and the housing may be formed by separate injection molding processes.

The inner housing coupled with the terminal may be formed by a first injection molding process, and the housing

may be formed by a second injection molding process with the pad being coupled to the inner housing.

As for another exemplary embodiment, in a connector which is disposed outside a case, the connector comprises: a terminal having one end protruded towards the inside of the case and the other end protruded towards the outside of the case; an inner housing coupled to the terminal in a way that one end and the other end of the terminal are protruded; a pad disposed on one surface of the inner housing; and a housing surrounding the inner housing and the pad, wherein the housing comprises: a protrusion portion protruding from one surface of the case; and a mounting portion formed with a terminal groove wherein the other end of the terminal being protruded is disposed, and the housing may comprise a discharge pipe communicating the inside and the outside of the case.

A discharge flow path of hollow shape may be formed inside of the discharge pipe.

A discharge hole communicating with the discharge path may be formed on the bottom surface of the terminal groove.

A shielding film covering the discharge hole may be further included.

The discharge pipe may comprise: a first discharge pipe extending upward from a lower surface of the case and disposed inside the protrusion portion; and a second discharge pipe extending from a bottom surface of the terminal groove and communicating with the first discharge pipe.

The first discharge pipe and the second discharge pipe may be disposed perpendicular to each other.

The second discharge pipe may be connected to a side surface which is a region between an upper end and a lower end of the first discharge pipe.

The protrusion portion and the mounting portion may comprise a hollow in which the terminal is disposed.

The terminal may comprise a power supply terminal for supplying power to the electronic component and a signal supply terminal for transmitting and receiving a signal of the electronic component, wherein the bottom surface may be disposed with a partition wall that separates the power supply terminal from the signal terminal.

Advantageous Effects

According to the present invention, there is an advantage in that since there is no need for a separate structure for discharging heat or fluid to the outer surface of the case, the number of components is reduced and the manufacturing cost is lowered.

In addition, there is an advantage in that a free space for disposing separate parts on the outer surface of the case is provided, and the degree of freedom of design is increased.

Further, since the pad tightly surrounds the terminal even in a high-temperature and high-pressure injection molding process, there is an advantage in that the bonding force between the terminal and the housing can be enhanced.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a perspective view showing a part of an electrical component according to the prior art.

FIG. **2** is a perspective view of a connector according to a first embodiment of the present invention.

FIG. **3** is a front view of the connector of FIG. **2** viewed from the terminal groove.

FIG. **4** is a cross-sectional view taken along the line I-I' of FIG. **3**.

FIG. **5** is a perspective view of a connector according to a second embodiment of the present invention.

FIG. **6** is a cross-sectional view of the connector of FIG. **1** viewed from the terminal groove.

FIG. **7** is a cross-sectional view taken along line I-I' of FIG. **6**.

FIG. **8** is an exploded perspective view of the inner housing according to the second embodiment of the present invention.

FIG. **9** is a view showing a manufacturing process of a connector according to a second embodiment of the present invention.

BEST MODE

Since the present invention, which will be described hereinafter, may apply to various modifications and may have various exemplary embodiments, some specific exemplary embodiments are illustrated in the drawings and will be described in detail in the detailed description.

This, however, is by no means to restrict the invention to the specific embodiments, it is to be understood as embracing all modifications, equivalents and substitutes included in the spirit and scope of the present invention. If the specific description of the related art in the following description of the present invention that are determined to obscure the gist of the invention, the detailed description thereof is omitted.

The terms used in the present specification are merely used to describe particular exemplary embodiments, and are not intended to limit the present invention. Expressions in singular forms include plural forms unless the context clearly indicates otherwise. In this application, the terms "comprise," "have," and the like are intended to specify the features, numbers, steps, actions, components, parts, or one that exists combinations thereof described in the specification, but are not intended to preclude the one or more other features, numbers, steps, actions, components, parts, or the presence or possibility of combinations thereof.

Further, terms such as "first", "second" may be used to separately describe various elements, but the above elements shall not be restricted to the above terms. These terms are only used to distinguish one element from the other.

In this specification, a connector is disposed on an outer surface of a case having a plurality of parts therein, and comprises a terminal for being electrically connected to at least one of the plurality of parts. It will therefore be readily apparent to those skilled in the art that the configuration according to the embodiments described herein may be applied to various devices having terminals.

FIG. **2** is a perspective view of a connector according to a first embodiment of the present invention; FIG. **3** is a front view of the connector of FIG. **2** viewed from the terminal groove; and FIG. **4** is a cross-sectional view taken along line I-I' of FIG. **3**.

Referring to FIGS. **2** and **3**, a connector **100** according to a first embodiment of the present invention comprises a housing **20** and a terminal **50** disposed in the housing **20**.

The housing **20** is formed on an outer surface of a case **10** in which various electronic components (not shown) are disposed. In other words, it can be understood that the housing **20** is provided on the outer surface of the case **10**, which is an external shape of the electrical component.

In detail, the housing **20** comprises a protrusion portion **30** protruding from the outer surface of the case **10** and a mounting portion **40** extending from one surface of the

protrusion portion **30** to form a terminal groove **42**. A hollow is formed in the housing **20** so that the terminal **50** is disposed.

Electronic components (not shown) electrically connected to the terminals **50** are disposed inside the case **10**. For example, the electronic component may be a printed circuit board that transmits and receives a control command. Accordingly, the terminal **50** may be connected to the printed circuit board at one end thereof and may be exposed to the outside through the mounting groove **42** of the mounting portion **40** at the other end. A hole (not shown) may be formed in the case **10** to allow the terminal **50** to pass therethrough.

The case **10** may be formed integrally with the housing **20**. For example, the electronic component may be disposed inside a separate case, and the housing **20** of the connector **100** comprising the case **10** may be mounted in the separate case. In this case, a mounting hole for mounting the connector **100** may be formed in the separate case.

The protrusion portion **30** is extended upward from the upper surface of the case **10**. A hollow is formed in the protrusion portion **30** so that the terminal **50** is disposed. A step portion **21** which upwardly separates the housing **20** so that a separate plug (not shown) which is coupled to the mounting groove **42** of the connector **100** is easily coupled.

The mounting portion **40** is formed on the front surface of the protrusion portion **30**. When the surface on which the mounting portion **40** is formed is referred to as a front surface, the front surface of the mounting portion **40** is formed with a terminal groove **42** which is recessed towards the rear so that the terminal **50** is exposed to the outside. Therefore, it is understood that the hollow formed inside the housing **20** is extended upward from the upper surface of the case **10** and communicates with the terminal groove **42**.

Meanwhile, the material of the case **10** and the housing **20** may be any one of plastic and resin.

One end of the terminal **50** is electrically connected to the electronic component and the other end is exposed to the outside through the mounting groove **42**. That is, the other end of the terminal **50** is protruded from the bottom surface **43** (refer to FIG. **4**) of the mounting groove **42** and is exposed to the outside. A separate plug which is in electrical contact with the terminal **50** is inserted into the mounting groove **42** so that power is supplied to the electronic component through electrical contact with the terminal **50** or a separate signal may be transmitted or received.

The terminal **50** may be bent at least once. Since the mounting portion **40** is extended forward from the front surface of the protrusion portion **30**, the terminal **50** can also be bent forward at a vertical end extending from the electronic component.

The plurality of terminals **50** may be provided. For example, the terminal **50** may comprise a power supply terminal **52** for supplying power to the electronic components, and a signal terminal **51** for transmitting and receiving signals to and from the electronic components. The power terminal **52** and the signal terminal **51** are spaced apart from each other and may be divided at the bottom surface **43** of the mounting groove **42**. Further, a partition wall separating the power terminal **52** from the signal terminal **51** may be disposed in the mounting groove **42**.

Hereinafter, the discharging structure which is an essential part of the present invention will be described.

Referring to FIGS. **2** and **3**, a discharge flow path **80** is formed in the connector **100** according to the first embodiment of the present invention. The discharge flow path **80** is extended from the bottom surface **43** of the mounting groove **42** to the inside of the case **10** so that the inside and the outside of the case **10** communicate with each other. Heat or fluid generated in the case **10** is discharged to the outside through the discharge flow path **80**.

The discharge flow path **80** comprises a first discharge flow path **62** extending from the outer surface of the case **10** towards the inner space of the protrusion portion **30** and a second discharge flow path **74** extending from the bottom surface **43** of the mounting groove **42** to the first discharge flow path **62** so as to be communicating with the first discharge flow path **62**. It can be understood that the internal space of the electrical component, that is, the inside of the case **10**, and the outside are communicating with each other through the discharge flow path **80**.

The first discharge flow path **62** may be formed inside the first discharge pipe **60**. The first discharge pipe **60** may extend upward from the lower surface of the case **10** and be disposed inside the protrusion portion **30**. In this case, in order to communicate with the inside of the case **10**, a communicating hole **12** may be formed in a region of the case **10** to which the lower end of the first discharge pipe **60** is coupled. The upper end of the first discharge pipe **60** extending upward may be disposed adjacent to the upper side of the protrusion portion **30**.

The second discharge flow path **70** may be formed inside the second discharge pipe **70**. The second discharge pipe **70** is extended rearward from the bottom surface **43** and is coupled to one side of the first discharge pipe **60**. The first discharge pipe **60** and the second discharge pipe **70** may be disposed perpendicular to each other.

At this time, the first discharge pipe **60** and the second discharge pipe **70** are coupled so that the first discharge flow path **62** and the second discharge flow path **74** are in communication with each other. To this end, a communication hole (not shown) may be formed on the outer surface of the first discharge pipe **60** so that the second discharge pipe **70** may be coupled to the communication hole. Alternatively, the first discharge pipe **60** and the second discharge pipe **70** may be integrally formed.

The second discharge pipe **70** is disposed in a region between the upper end and the lower end of the first discharge pipe **60**. That is, when the first discharge pipe **60** is divided into the upper part and the lower part based on the area where the second discharge pipe **70** is coupled, the upper part of the first discharge pipe **60** The first discharge flow path **62** can be formed wider. Therefore, the heat generated from the inside of the case **10** can be discharged to the outside of the case **10** more efficiently.

A shielding film **72** is provided in the discharge hole **73** formed at the outlet of the second discharge flow path **70**, that is, the bottom surface **43** of the terminal groove **42**, based on the flow of heat and fluid. The discharge hole **73** can communicate with the discharge flow path **80**.

The shielding film **72** covers the discharge hole **73** to prevent moisture or dust from entering the interior of the housing **20**. That is, the shielding film **72** passes the heat or fluid discharged from the second discharge channel **70** to the outside, and prevents moisture or dust existing in the outside from flowing into the inside of the housing **20**.

Accordingly, the heat or gas generated in the electronic component (printed circuit board) which may be provided on the lower side of the case **10** with reference to inside the case **10**, that is, FIG. **4**, can be discharged to outside through the discharge flow path.

According to the connector **100** of the above configuration, since a separate structure for discharging heat or fluid is not required on the outer surface of the case **10**, there is

an advantage that the number of parts is reduced and the manufacturing cost is lowered.

In addition, there is an advantage in that a free space for disposing separate parts on the outer surface of the case is provided, and the degree of freedom of design is increased.

In this embodiment, the first discharge flow path **62** and the second discharge flow path **74** are disposed inside the first discharge pipe **60** and the second discharge pipe **70**, respectively, however, only the discharge flow paths **62** and **74** may be formed in the protrusion portion **30** except for the first discharge pipe **60** and the second discharge pipe **70**.

Hereinafter, a connector according to a second embodiment of the present invention will be described.

FIG. **5** is a perspective view of a connector according to a second embodiment of the present invention; FIG. **6** is a cross-sectional view of the connector of FIG. **1** viewed from the terminal groove; and FIG. **7** is a cross-sectional view taken along the line I-I' of FIG. **6**.

Referring to FIGS. **5** to **7**, the connector **200** according to the second embodiment of the present invention comprises a housing **120** and a terminal **150** disposed in the housing **120**.

The housing **120** is formed on an outer surface of a case **110** in which various electronic components (not shown) are disposed. Particularly, the housing **120** comprises a protrusion portion **130** protruding from the outer surface of the case **110** and a mounting portion **140** extending from one surface of the protrusion portion **130** and having a terminal groove **142** formed on the outer surface thereof. And a hollow is formed inside the housing **120** so that the terminal **150** is disposed.

Electronic components (not shown) electrically connected to the terminals **150** are disposed in the case **110**. For example, the electronic component may be a printed circuit board that transmits and receives various control commands. Therefore, one end of the terminal **150** may be electrically connected to the printed circuit board, and the other end may be exposed to the outside through the mounting groove **142** of the mounting portion **140**. The case **110** may have a hole **113** through which the terminal **150** passes.

Alternatively, the case **110** may be formed integrally with the housing **120**. For example, the electronic component may be disposed inside a separate case, and the housing **120** of the connector **200** comprising the case **110** may be mounted in the separate case. For this purpose, the separate case may be formed with a hole for coupling the connector **200** thereto.

The protrusion portion **130** is extended upward from the upper surface of the case **110**. A hollow is formed in the protrusion portion **130** so that the terminal **150** is disposed. A step portion **121** may be formed on the upper surface of the case **110** to separate the housing **120** upwardly so that a separate plug to be coupled to the connector **200** can be easily coupled.

The mounting portion **140** is formed on one side of the protrusion portion **130**. When the surface on which the mounting portion **140** is formed is referred to as a front surface, a terminal groove **142** recessed toward the rear is formed on the front surface of the mounting portion **140** so that the terminal **150** is exposed to the outside. Therefore, it is understood that the hollow formed inside the housing **120** is extended upward from the upper surface of the case **110** and communicates with the terminal groove **140**.

Meanwhile, the material of the case **110** and the housing **120** may be plastic or resin.

One end **159***b* of the terminal **150** is electrically connected to the electronic component, and the other end **150***a* is exposed to the outside through the mounting groove **142**. That is, it is understood that the other end **150***a* of the terminal **150** is protruded from the bottom surface of the mounting groove **142** and is exposed to the outside. A separate plug (not shown), which is in electrical contact with the terminal **150**, is inserted into the mounting groove **142** so that it may provide a power to the electronic components or may receive and transmit a separate signal through electrical contact with the terminal **150**.

As illustrated, the terminal **150** may be bent at least once. Since the mounting portion **140** is extended forward from the front surface of the protrusion portion **130**, the terminal **150** can also be extended forward as a vertical end extending upward from the electronic component is being bent.

The terminal **150** may be provided in plurality. For example, the terminal **150** may comprise a power terminal **151** for supplying power to the electronic components, and a signal terminal **151** for transmitting and receiving signals to the electronic components. The power supply terminal **151** and the signal terminal **151** are spaced apart from each other and may be divided at the bottom surface of the mounting groove **150**.

Hereinafter, the structure of the housing **120**, which is an essential part of the present invention, will be described.

FIG. **8** is an exploded perspective view of the inner housing according to the second embodiment of the present invention.

Referring to FIGS. **7** and **8**, a separate inner housing **132** to which the terminal **150** is mounted may be disposed in the housing **120**. The inner housing **132** is disposed in the hollow formed inside the housing **122** and supports the terminal **150**.

In detail, the inner housing **132** may be disposed inside the protrusion portion **130** such the lower surface thereof faces the case **110** and the front surface thereof faces the mounting groove **142**. It is therefore understood that one end **150***b* of the terminal **150** is protruded downward from the lower surface of the inner housing **132** and protruded forward from the front surface of the inner housing **132** of the other end **150***a*. For this, holes **132***a* and **132***b* may be formed on the front and bottom surfaces of the inner housing **132**, respectively, to allow the terminal **150** to pass therethrough.

A pad seating portion **134** is formed on the front surface of the inner housing **132** so that the pad **133** is seated. The pad seating portion **134** may be formed such that a portion of the front surface of the inner housing **132** is recessed rearwardly to be stepped with respect to other regions. Meanwhile, the width of the pad seating portion **134** is formed corresponding to the width of the pad **133**, so that when the pad **133** is attached to the pad seating portion **134**, the front surface of the pad **133** the front surface of the inner housing **132** can form a sense of unity with each other.

The pad **133** is seated on the pad seating portion **134**. A separate hole **132***a* may be formed in the pad **133** to allow the terminal **150** to pass therethrough. The hole **133***a* may be formed in advance at the time of manufacturing the pad **133**, but hole **132***a* may also be formed when the terminal **150** is penetrating through the pad **133** during the process wherein the pad **133** is coupled to the pad seating portion **134**.

In other words, since the terminal **150** is protruded from one surface of the pad **133**, in other words, it can be understood that the pad **133** is disposed on the bottom surface of the mounting groove **142**.

The position of the other end **150***a* of the terminal **150** protruding from the bottom surface of the mounting groove **142** can be firmly fixed by the pad **133** and the inner housing **132**.

The material of the pad **133** may be an elastically deformable material. For example, the material of the pad **133** may be rubber or silicon.

Hereinafter, a manufacturing process of the connector **200** will be described.

FIG. **9** is a view showing a manufacturing process of a connector according to a second embodiment of the present invention.

Referring to FIG. **9**, the connector **200** according to the second embodiment of the present invention can be manufactured by a double injection molding process. The double injection molding is divided into a first injection molding process, which is a manufacturing process of the inner housing **132**, and a second injection molding process, which is a manufacturing process of the connector **200** as a whole.

First, the terminal **150** is mounted on the inner housing **132** manufactured by the first injection molding process. One end **150***b* of the terminal **150** connected to the electronic component is extended downward from the lower surface of the inner housing **132** and the other end **150***a* exposed through the mounting groove **142**, is extended forward from the front surface of the inner housing **132**.

The pad **133** is seated on the pad seating portion **134**. Therefore, since the other end **150***a* of the terminal **150** is supported while it is being inserted in the pad **133**, the position can be firmly fixed.

Next, to form the entire housing **120** of the connector **200**, the inner housing **132** having the pad **133** fitted therein is fixed to the mold P, and the raw material is injected and heated.

Conventionally, since the material of the housing and the terminal are different from each other, a gap is generated between the housing and the terminal during the injection molding process due to the different thermal expansion coefficient. As a result, there is a problem in that the bonding force between the terminal and the housing is poor, the product defect rate increases, and failures frequently occur.

According to the present embodiment, since the terminal **150** is firmly surrounded by the pad **133** even in a high-temperature and high-pressure injection molding process, there is an advantage in that the position between the terminal **150** and the inner housing **132** can be fixed. This is because, even if a part of the pad **133** is melted in a high temperature process, the terminal **150** is still wrapped in the process of cooling, so that the terminal **150** can be continuously aligned with the preset position.

Although not shown, the pad **133** may be coupled to the lower surface of the inner housing **132** in addition to the pad seating portion **134**. The pad **133** is disposed on the front and bottom surfaces of the inner housing **132** where the terminals **150** are being protruded so that both ends of the terminals **150** is supported by the pad **133**, and thus the position of the terminal **150** can be more firmly fixed.

Although the connector according to the first embodiment and the connector according to the second embodiment are described with different reference numerals, the scope of the present invention is not limited thereto, and the connector according to the first embodiment And the technical idea of the connector according to the second embodiment can be employed together in a single connector. For example, it is also included in the technical idea of the present invention that the housing having the heat radiation structure of the connector according to the first embodiment is provided with the pad and the pad seating portion arranged in the connector according to the second embodiment.

It should be noted that the exemplary embodiments disclosed in the drawings are merely examples of specific examples for the purpose of understanding, and are not intended to limit the scope of the present invention. It will be apparent to those skilled in the art that other modifications based on the technical spirit of the present invention are possible in addition to the exemplary embodiments disclosed herein.

The invention claimed is:

1. A connector which is disposed outside a case, the connector comprising:

a terminal including a first end disposed in the case and a second end disposed outside the case;

an inner housing coupled to the terminal such that the first end of the terminal protrudes from an outer surface thereof and the second end of the terminal protrudes from a protruding surface of the inner housing;

a pad having a first surface disposed on the protruding surface of the inner housing, a second surface that faces in a direction away from the first surface, and a bottom surface that is between the first surface and the second surface; and

a housing surrounding the inner housing and surrounding the pad, wherein the housing comprises:

a protrusion portion protruding from one surface of the case; and

a mounting portion having a terminal groove in which the pad and the second end of the terminal is provided;

wherein the inner housing includes a pad seating portion formed to be stepped with another area that is disposed on one surface of the inner housing, the pad is seated on the pad seating portion such that the bottom surface of the pad is coupled to the pad seating portion and the first surface of the pad contacts the protruding surface of the inner housing.

2. The connector according to claim **1**, wherein material of the pad is an elastically deformable material.

3. The connector according to claim **1**, wherein

the second surface of the pad and the another area are aligned on a same plane.

4. The connector according to claim **3**, wherein a width of the pad seating portion corresponds to a width of the pad.

5. The connector according to claim **1**, wherein a separate pad is coupled to the lower surface of the inner housing.

6. The connector according to claim **1**, wherein the inner housing and the housing are formed by separate injection molding processes.

7. The connector according to claim **6**, wherein the inner housing coupled with the terminal is formed by a first injection molding process, and the housing is formed by a second injection molding process with the pad being coupled to the inner housing.

8. A connector which is disposed outside a case, the connector comprising:

a terminal including a first end disposed in the case and a second end disposed outside the case;

an inner housing coupled to the terminal such that the first end of the terminal protrudes from the inner housing and the second end of the terminal protrudes from a protruding surface of the inner housing;

a pad having a first surface facing the protruding surface of the inner housing, a second surface facing away from the inner housing, and a bottom surface; and

a housing surrounding the inner housing and surrounding the pad, wherein the housing comprises:

a protrusion portion protruding from one surface of the case;

a mounting portion formed with a terminal groove wherein the second end of the terminal being protruded is disposed; and

a discharge pipe communicating the inside and the outside of the case,

wherein the inner housing includes a pad seating portion formed to be stepped with another area that is disposed on one surface of the inner housing, the pad is seated on the pad seating portion such that the bottom surface of the pad is coupled to the pad seating portion and the first surface of the pad faces the protruding surface of the inner housing.

9. The connector according to claim **8**, wherein a discharge flow path of hollow shape is formed inside of the discharge pipe.

10. The connector according to claim **8**, wherein a discharge hole communicating with the discharge path is formed on a bottom surface of the terminal groove.

11. The connector according to claim **10**, further comprising a shielding film covering the discharge hole.

12. The connector according to claim **8**, wherein the discharge pipe comprises:

a first discharge pipe extending upward from a lower surface of the case and disposed inside the protrusion portion; and

a second discharge pipe extending from a bottom surface of the terminal groove and communicating with the first discharge pipe.

13. The connector according to claim **12**, wherein the first discharge pipe is perpendicular to the second discharge pipe.

14. The connector according to claim **12**, wherein the second discharge pipe is connected to a side surface which is a region between an upper end of the first discharge pipe and a lower end of the first discharge pipe.

15. The connector according to claim **8**, wherein the protrusion portion and the mounting portion comprise a hollow in which the terminal is disposed.

16. The connector according to claim **8**, wherein the terminal comprises:

a power supply terminal for supplying power to an electronic component, and

a signal terminal for transmitting and receiving a signal of the electronic component, wherein

a bottom surface of the terminal is provided with a partition wall that separates the power supply terminal from the signal terminal.

17. The connector according to claim **8**, wherein material of the housing includes plastics and resins.

18. The connector according to claim **8**, wherein a stepped portion for spacing the housing from the case is disposed on an outer surface of the case.

19. The connector according to claim **12**, wherein a length of the first discharge pipe is longer than a length of the second discharge pipe.

20. The connector according to claim **16**, wherein a mounting groove is provided with a partition for partitioning the power supply terminal and the signal terminal.

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